An Empirical Examination of Continuance Intention of Social Network Sites

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Abstract

Social network sites (SNSs) have drawn extensive attention among scholars and practitioners. In this study, we aim at explaining the continuance of SNSs. Specifically, we propose and empirically test a research model of continuance intention to use SNSs. We also examine the relative impacts of SNS-specific motivation factors and social factors derived from the SNS environment on continuance intention to use SNSs. Building upon expectation disconfirmation theory (EDT), our research model was empirically tested with 204 Facebook users through an online survey. While prior studies focus mostly on the SNS-specific motivations, our results demonstrated that social factors derived from the SNS environment play a dominant role in explaining the continuance intention to use SNSs. In particular, this study suggested that perceived critical mass, social presence, and social norms are influential and major factors that determine continuance intention. We believe that this study provides significant contributions to both researchers and practitioners in the context of SNSs.

Keywords: Expectation disconfirmation theory, Continuance intention, User satisfaction, Motivation to use, Social network sites

Introduction

Stepping into the cyber era, the explosive diffusion and evolution of broadband service, personal computers, and smartphones have cultivated fertile grounds for social network sites (SNSs) to flourish. SNSs have significantly transformed the way of online interaction and gained legitimacy among business sectors for their applications across various marketing and promotion activities. Up to present, the world leading social network site, Facebook has recorded 1.15 billion monthly active users as of June 30, 2013, an increase of 21% year-over-year (Facebook, 2013a). The dominance of Facebook in the social media world has come under threat in recent years, as alternative social networks (e.g., Path, Tumblr, and Reddit) have attracted the attention of those looking for fresh online playgrounds. To consolidate the current leading position, Facebook has made constant updates to the site by introducing new features. For example, Facebook introduced "Graph search," a semantic search engine allowing users to find new friends of similar interests (Facebook, 2013c). The ultimate goal of the moves is to bring current users with freshness so as to retain them. However, recent usage statistics have revealed that the expansion of Facebook in the United States, the United Kingdom, and other major European countries has peaked. In the first quarter of 2013, Facebook lost 6 million visitors in the United States (i.e., a 4% fall) and 1.4 million in the United Kingdom (i.e., a 4.5% fall), and the decline continues (SocialBakers, 2013). The drivers of users' continuance to use SNSs remains as a myth to SNSs service providers.

Sustaining a stable and sound user base is a prerequisite for the success of SNSs, and that failure in retaining users would seriously jeopardize the sites' development and profitability. Critical mass theory of interactive media elucidates the importance of having a sufficient number of users towards an innovation so that the rate of adoption becomes self-sustaining and creates further growth. Critical mass theory suggests that the success of interactive media relies on the retention of persistent users (Markus, 1987). The stickiness of users is pivotal to SNS developers in realizing their strategic moves, as it directly affects the stock price and advertising revenue, and thus has an influential impact on the sustainability of SNSs. Therefore, understanding the factors that drive users to continue using SNSs is of prime importance.

Prior research has indicated that the continuance use of an information system (IS) can be more important, compared to the initial acceptance, to its long-term viability and success (Bhattacherjee, 2001). Existing literature on SNSs is diversified, with a majority of studies concentrating on the initial adoption of SNSs (e.g., Somkiat et al., 2012), and a considerable number of studies investigating self-disclosure (e.g., De Souza and Dick, 2009) and privacy concerns in SNSs (e.g., Weiss, 2009). Surprisingly, only a few studies have examined what drive post adoption behaviors of SNSs (e.g., Kang and Lee, 2010; Kim, 2011; Yin et al., 2013). Studies on post adoption behaviors of SNSs mostly rooted in expectation disconfirmation theory and suggested that users evaluate their usage experiences and make a rational decision about their continuance. However, these studies rarely take into account the impacts of social factors derived from the SNS environment. SNSs enable users to visualize and articulate their social networks and engage in social interactions in a dynamic, interactive, and multimodal form. Given the unique social nature of communication, it is necessary to extend existing work by examining the role of social factors derived from the SNS environment in explaining the continuance intention to use SNSs.

Accordingly, there are two major objectives of the current study. First, we propose and empirically test a comprehensive research model explaining the continuance intention to use SNSs. Second, we examine the

relative impacts of SNS-specific motivation factors and social factors on the continuance intention to use SNSs. The current study marks several contributions to the emerging literature on SNS continuance. First, this study is among the first to study how users are motivated in SNS context, shedding light for future research on continuance in social technologies. Second, the current investigation extends the generalizability of EDT and suggests that EDT is predictive in understanding the continuance intention of SNSs. Finally, the findings offer substantial insights for practitioners to develop suitable updates and maintain the attractiveness of SNSs in the highly competitive social media industry.

The remaining of the paper is organized as follows. First, we provide a review of the prior literature on social network sites and social factors derived from the SNS environment. Second, we introduce the theoretical foundation of our research model and develop the hypotheses. Third, we describe the research method and data analysis. Finally, we discuss the theoretical and practical implications, as well as the limitations and future research directions.

Theoretical Background

Prior Research on Social Network Sites

Social network sites (SNSs) are web-based platforms that allow users to build their profiles in a bounded system and share connections with their friends (Boyd and Ellison, 2007). SNSs integrate digital communication and publishing together, making the communication among members simple across time and space (Dwyer et al., 2008). A significant characteristic of SNSs is that they enable users to become visible in the social networks and build connections between individuals.

Early research on SNSs has mostly focused on the adoption and initial use of SNS. Specifically, these studies concentrated on identifying motivations that entice a user to use SNSs. For example, Ellison et al. (2006) identified four motives of using social network sites: maintaining offline contacts, meeting new people, information seeking, and entertainment. Nyland and Near (2007) identified five motivations related to the use of online social networks: meeting new people, entertainment, maintaining relationships, learning about social events, and sharing media. Joinson (2008) found seven motivations including social connection, shared identities, photographs, content, social investigation, social network surfing and status updates.

In the recent years, there has been an increasing attention given to the post-adoption behaviors in SNSs. Researchers have studied continuance use of SNSs from different theoretical perspectives, such as expectation disconfirmation theory (e.g., Barnes and Böhringer, 2011; Mouakket, 2015), motivation theory (e.g., Lin and Lu, 2011), Maslow's hierarchy of needs theory (e.g., Cao et al., 2012), relational capital theory (e.g., Chen et al., 2016), use and gratification theory (e.g., Chiu and Huang, 2015; Ku et al., 2013), theory of self-regulation (e.g., Lin et al., 2014), and theory of planned behavior (e.g., Rajput, 2015). These studies reported several factors that are influential in predicting the post-adoption behaviors in SNSs, such as perceived usefulness (Barnes and Böhringer, 2011), perceived enjoyment (Lin and Lu, 2011) and satisfaction (Kim, 2011). Nevertheless, social factors derived from the SNS environment have been overlooked in these studies; there is a paucity of research investigating the influence of social factors on SNS continuance.

Social Factors and Social Network Site Use

Different from traditional and individual-based information technologies, SNSs represent a new form of online communication and interaction technology that involves groups of users. Prior research frameworks focusing on individual or

personal factors of information technology use might not fit into the context of SNSs (Cheung and Lee, 2010). In the context of SNSs, one's continuance intention to use SNSs is more likely to be determined by the social interactions with other friends in the social network. Social interactions in SNSs can be achieved through utilizations of various sophisticated functionalities embedded, such as instant messaging, information sharing or tweeting, social events organizing and so on. These kinds of social and interactive technologies become meaningful only when a group of users is willing to use collectively and continuously. It is, therefore, important to consider social factors that are unique to the SNS environment and affect users' behaviors in the platforms.

Traditional research on information systems use has emphasized the role of social factors in driving user behaviors (e.g., Lewis et al., 2003; Lucas and Spitler, 2000; Taylor and Todd, 1995; Venkatesh and Morris, 2000; Venkatesh et al., 2003). In the context of SNSs, Xu et al. (2012) reported that social presence is one of the most predictive antecedents of SNSs usage; Kim (2011) suggested that interpersonal influence affected SNS continuance intention; Al-Debei et al. (2013) and Chen et al. (2012) indicated that subjective norms predicted continuance participation behaviors on SNSs. Among all the social factors suggested in prior studies, perceived critical mass, social presence, and social norms are found to be consistently predictive of users' continuance intention. Thus, the current study incorporated these three social factors into research model and explored their relative impacts on continuance intention to use SNSs.

Research Model

Expectation Disconfirmation Theory

Expectation disconfirmation theory (EDT) has been widely adopted in understanding satisfaction and IS continuance (Bhattacherjee, 2001). Traditionally, EDT has been used to explain an individual's behavioral intention process from initial pre-use expectations to post-use perceptions of a product, suggesting that consumers' repurchase intention is determined by the level of satisfaction with the product/service, pre-purchase expectation and post-consumption disconfirmation (Oliver, 1980). In EDT, satisfaction is held as the predominant predictor of repurchase intention, as it is often viewed as the key to building and sustaining consumer loyalty. The predictive power of EDT has been demonstrated across different contexts and disciplines, such as product repurchase and service continuance (e.g., Dabolkar et al., 2000; Patterson et al., 1997; Spreng et al., 1996). In the IS literature, Bhattacherjee (2001) is one of the pioneers who incorporated EDT to understand IS continuance. The IS continuance model posits that continuance intention to use an IS depends on the users' level of satisfaction, perceived usefulness, and disconfirmation. Numerous prior studies have demonstrated the applicability of EDT in information technology research, such as strategic system usage (Lankton et al., 2014), e-learning (Chou et al., 2012), question-and-answer site (Ruth, 2012) and mobile Internet (Hong et al., 2006).

Hypotheses Development

The proposed research model is built upon expectation disconfirmation theory (EDT). As noted in the previous section, EDT has been widely adopted by IS scholars to understand the post-adoption behaviors in the online contexts. We substantially extended the theory by adapting it to the context of SNSs and incorporating with social factors identified in the previous section to embrace the social and interactive characteristics of SNSs. Three social factors are added to the proposed model, namely, perceived critical mass, social norms, and social presence. Perceived critical mass and social norms are viewed as an important predominant of users' continuance intention to use SNSs.

When more people are attracted and interacted with the site, it is harder for existing users to give up the use or switch to another platform. Thus, perceived critical mass and social norms become more influential in driving users' continuance intention when more people stick with the site (Dickinger et al., 2008). On the other hand, social presence induces the feeling of intimacy and immediacy that users will normally feel in face-to-face communication (Song and Wang, 2011). Friends in the online social circle and interactive functionalities embedded in SNSs, such as real-time communications, presence awareness, and emotional icons, are capable of inducing feelings of the psychological presence of others, leading to higher level of perceived closeness and satisfaction. In particular, the extended model postulates that continuance intention to use SNSs is determined by user satisfaction, social norms and perceived critical mass, whereas user satisfaction is influenced by disconfirmation of SNS-specific motivations and social presence. Figure 1 depicts the proposed research model.

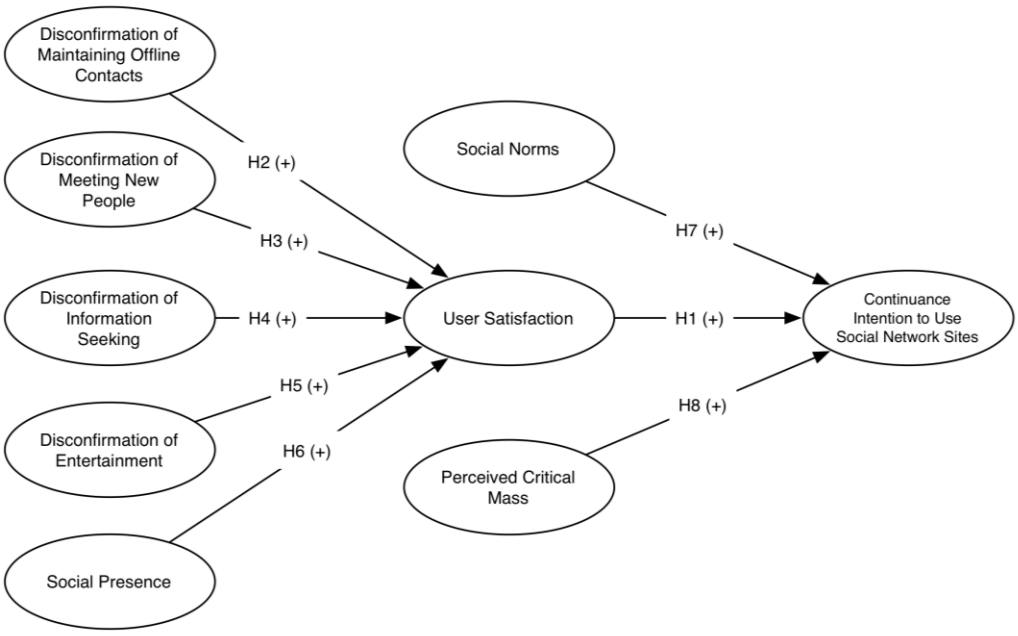


Figure 1 - Research model

User Satisfaction and Continuance Intention

Satisfaction has been a core research topic in the IS continuance studies. According to expectation disconfirmation theory, a user's continuance intention to use an information system is primarily determined by his/her satisfaction with prior uses (Bhattacherjee, 2001). Satisfaction reflects a user's psychological or affective state resulting from a cognitive appraisal of disconfirmation (Bhattacherjee, 2001). This evaluative feeling is identical to the notion of attitude in the IS use literature (Melone, 1990). Thus, the relationship between attitude and intention validated in IS use research provides additional support for the link between satisfaction and continuance intention. Users who are more satisfied with their experience will have a higher level of continued use intention. Prior studies have confirmed that satisfaction produces a strong positive effect on the users' continuance intention in various IS contexts, such as mobile Internet (Hong et al., 2006),

e-learning (Ho, 2010; Liao et al., 2009), blended learning (Al-busaidi and Al-shihi, 2012), online shopping (Wen et al., 2011) and blog (Shiau and Chau, 2012). Barnes and Böhringer (2011) further testified the relationship in the context of Twitter, suggesting that continued use intention is strongly determined by perceived useful, habit and satisfaction. Cao et al. (2012) also confirmed a positive relationship between satisfaction and continuance intention. Building upon this line of arguments, it is expected that user satisfaction with prior usage experience will positively influence their continuance intention to use a social network site. Thus:

H1: Users' satisfaction is positively related to their continuance intention to use SNSs.

Motivations of Using SNSs and User Satisfaction

The motivations of using SNSs explain why people want to use them and what they want to achieve by using them. In the current study, the classification from Ellison et al. (2006) is adopted for two reasons. First, Ellison et al. (2006) classified motivations to use SNSs into four categories that are coherent with actual usage patterns, namely maintaining offline contacts, meeting new people, information seeking, and entertainment. This classification is similar to the actual use pattern of SNS users revealed in prior survey reports (e.g., PewInternet, 2011). Second, regarding concept clarity and simplicity, the classification of Ellison et al. (2006) is clearer and simpler when comparing with other classifications reviewed. Thus, it is an ideal classification for the current study. The definition and explanation of these motivations are summarized below:

- *Maintaining offline contacts:* To find offline friends and classmates on SNSs, communicate with them and know what they are doing and how they are recently
- *Meeting new people:* To communicate and make acquaintance with people who have not met in person before
- *Information seeking:* To look for hot topics, new trends, interesting news, useful information and many other things that are shared and discussed on SNSs
- *Entertainment:* To entertain themselves in their spare time and pass the time when they feel bored, such as playing games or IQ test or interact with friends

Nevertheless, motivation is a user's pre-use expectation towards an information system, which plays a role in the initial acceptance stage. In the post-adoption stage, the motivations do not influence user satisfaction directly, but through the discrepancy (disconfirmation) between the pre-use expectation and the perceived performance (Bhattacherjee, 2001). Specifically, user satisfaction is expected to be determined by the disconfirmations between the expectation and the perception of how well these motivations are achieved. In the context of SNSs, it is believed that if the perceived performance of a social network site is better than or the same as the user's pre-use expectation, he/she will be satisfied and will continue to use it. In this study, it is expected that users form the expectations of the use of SNSs in four major aspects, namely maintaining offline contacts, meeting new people, information seeking, and entertainment. After the initial use, they compare their experience with their expectation and form the disconfirmation of the usage on the four major aspects. The disconfirmations of the use of SNSs will then affect user satisfaction. Thus:

H2: Users' positive disconfirmation of maintaining offline contacts is positively related to their satisfaction in SNSs.

H3: Users' positive disconfirmation of meeting new people is positively related to their satisfaction in SNSs.

H4: Users' positive disconfirmation of information seeking is positively related to their satisfaction in SNSs.

H5: Users' positive disconfirmation of entertainment is positively related to their satisfaction in SNSs.

Social Presence and User Satisfaction

Social presence is recognized as an important element in understanding user attitude and behavior in the online context (Kim et al., 2007). It refers to the extent to which a medium allows users to experience others as being psychologically present (Fulk et al., 1987) and is viewed as a quality of a communication medium. Social presence theory has revealed that higher degree of social presence in a medium reflects higher sociability of the medium (Short et al., 1976). It is, therefore, essential to web-based communication platforms as it reflects the ability to transmit information about facial expression, posture, and non-verbal cues in an online context (Short et al., 1976), which in terms making the interaction more natural and intimate. Social presence has been widely studied in various online contexts, such as e-learning (Richardson and Swan, 2003), online shopping (Hassanein and Head, 2006) and e-service (Gefen and Straub, 2004). Bulu (2012) further demonstrated that social presence directly predicted satisfaction in the virtual world, and similar findings were also found in consumer service study (e.g., He et al., 2012). The interactive features of SNSs are believed to improve the communication quality by conveying more cues and generating the perception of warm, personal, sociable and sensitive to the user. For example, the News Feed function in Facebook keeps users updated about their friends' latest status and makes them in touch with their friends. Consequently, the perception of social presence influence user satisfaction towards SNSs. Thus:

H6: Social presence *is positively related to users' satisfaction in SNSs.*

Social Norms and Continuance Intention

Social norms describe the extent to which a user perceives that others approve his/her use of certain information technology (Hsu and Lu, 2004). Social norms are often viewed as the customary rule that governs behaviors in groups. Theories of conformity in social psychology have suggested that group members tend to conform to the social norms (Lascu and Zinkhan, 1999), which in turn influence the perceptions and behaviors of members. Social norms are recognized as a significant predictor of individuals' intention to use information technology (Chang and Cheung, 2001), such that the effect is even stronger than the perception of ease of use and usefulness (Lucas and Spitler, 1999). In the context of SNSs, it is believed that when a user find that group members are using SNSs, he/she tends to comply with the group norms, and in turn continue to use SNSs. Thus:

H7: Social norms are positively related to continuance intention to use SNSs.

Perceived Critical Mass and Continuance Intention

Perceived critical mass is an individual's perception of whether technology has attracted a minimum number of users (Hsu and Lu, 2004; Lou et al., 2000). Perceived critical mass is built upon the notion of critical mass, which refers to the point where sufficient users have used technology to the extent that its continuance usage and growth is self-sustaining (Craig Van et al., 2007; Luo et al., 2010). Prior studies have demonstrated that perceived critical mass have a positive effect on users' intention to use groupware (Lou et al., 2000), instant messaging (Craig Van et al., 2007) and SNSs (Sledgianowski and Kulviwat, 2009). In the context of SNSs, perceived critical mass refers to the extent to which a user views that most of his peers are using SNSs. When users perceived that the site had reached the critical mass, social

interactions, such as grooming, poking and gossiping within site are guaranteed (Tufekci, 2008). Users will have a greater confidence towards the sustainability of the site and are more likely to stick with it. Thus:

H8: Perceived critical mass is positively related to continuance intention to use SNSs.

Research Method

Research Context and Sample

We empirically tested our research model among Facebook users in Hong Kong. Facebook is now one of the most popular and leading social network sites, with approximately 1.15 billion monthly active users in the second quarter of 2013 (Facebook, 2013a). In 2012, social networking was one of the most popular online activities among Hong Kong Internet users (DigitalJungle, 2012). Facebook has a remarkable penetration rate (58%) in Hong Kong, with heavy users aged primarily between 18-34 (SocialBakers, 2013). Characterized by the leading role of Facebook and its high penetration rate in Hong Kong, we believed that Hong Kong Facebook users are an appropriate and representative sample to understanding continuance intention to use SNSs in the current study.

Measures

In this study, we derived the measures of all the constructs from prior studies with minor modifications to fit the research context of social network sites. The use of self-reported measures is believed to be vital and qualified in the current study, as all of the constructs in the research model are the evaluation of users' cognition, emotion, and intention, rather than behavior (Zhou et al., 2012). Specifically, we measured the disconfirmations of SNS-specific motivations with the items derived from Ellison et al. (2006) on a seven-point scale ranging from "Much lower than your expectation" (-3) to "Much higher than your expectation" (+3). We measured user satisfaction with items derived from Bhattacherjee (2001) on a seven-point semantic differential scale. We measured social presence with the items derived from Gefen and Straub (2004), social norms with the items derived from Hsu and Lu (2004), perceived critical mass with the items derived from Ellison et al. (2006), and continuance intention with the items derived from Bhattacherjee (2001) on a seven-point Likert scale anchored with "1 = Strongly Disagree" to "7 = Strongly Agree".

Data Collection

Our target respondents of this study were current Facebook users in Hong Kong. We collected empirical data to test the model via an online survey among Facebook users. We first conducted a pilot study with 30 Facebook users. Respondents were invited to comment on the questionnaire for clarity and instructions, other than minor formatting issues; no major modification was made. We then distributed the online questionnaire in several groups on Facebook. Most of these groups are student groups from universities in Hong Kong. Participants were directed to the online questionnaire by clicking the link provided. In the first page of the online questionnaire, we informed the participants with the purpose and instructions of the current study. To encourage participation, we offered an incentive of five supermarket vouchers as lucky draw prizes.

Respondent Profile

We collected a total of 204 valid responses throughout the data collection period. The sample comprised of 44.1% male and 55.9% female respondents, 75% of them aged between 19-28. Most of the respondents are experienced users of Facebook with at least 6 months of usage experience. A total of 63.2% of the respondents visited Facebook every day, and 43.1% of them spent more than 30 minutes a day on Facebook. Recent user demographic data reaffirmed that young adults aged 18-29 are the dominant

Facebook users (86%). In terms of education attainment, 73% of the users are holding a college degree (PewInternet, 2012). In general, the sample is balanced across different demographic features is believed to be appropriate to study the continuance intention of SNS users. Table 1 provides the demographic characteristics of the respondents.

Table 1 - Respondent profile

Characteristics	No.	%
Gender		
Male	90	44.1%
Female	114	55.9%
Age		
18 or below	15	7.4%
19-28	153	75.0%
29-35	29	14.2%
36 or above	7	3.4%
Education level		
Secondary or high school	17	8.3%
Diploma or equivalent	12	5.9%
University or above	175	85.8%
Experience with the social network site		
1 month or less	8	3.9%
2-6 months	40	19.6%
7-11 months	60	29.4%
1 year or more	96	47.1%
Number of contacts on the social network site		
50 or less	43	21.1%
51-100	40	19.6%
101-200	62	30.4%
More than 200	59	28.9%
Frequency of visiting the social network site		
Once or more per day	129	63.2%
Once or more per week	62	30.4%
Twice or less per month	13	6.4%
The average time of using the social network site (minutes per day)		
Less than 15 minutes	43	21.1%
15-30 minutes	73	35.8%
30-60 minutes	41	20.1%
More than 60 minutes	47	23.0%

Data Analysis

We employed structural equation modeling techniques to analyze the research model. In particular, we utilized SmartPLS 2.0 M3 to perform the test. PLS is preferred over other statistical analysis tools as (1) it facilitates the simultaneous assessment of both the measurement model (reliability and validity of measures) and the structural model (relationships among theoretical constructs), and (2) it also possesses the ability in modeling latent constructs under condition of non-normality and manipulate small to medium size samples well, and is highly compatible in analyzing highly complex predictive models (Chin, 1998).

Measurement Model

Convergent Validity

Convergent validity refers to the extent to which the items that are theoretically related to each other should be related in reality. Composite reliability and the average variance extracted (AVE) are two common indices used to assess convergent validity

of measures. Composite reliability of 0.7 or above and AVE of greater than 0.5 are considered as acceptable (Fornell and Larcker, 1987). Table 2 summarizes the composite reliability, AVE and item loadings. All the items showed significant path loadings to their respective construct at 0.01 significance level, and all indices of convergent validity exceed the recommended thresholds, with composite reliability ranging from 0.826 to 0.937 and AVE ranging from 0.585 to 0.881.

Table 2 - Psychometric properties

Construct	Items		Loading
Disconfirmation of Maintaining Offline Contacts (DMOC) CR=0.826 AVE=0.613	Compared with your pre-expectation, indicate your perception of the experience of using Facebook in performing the following functions:		
	DMOC1:	To check out someone you met socially.	0.817
	DMOC2:	To learn more about other people in your classes/workplace.	0.767
	DMOC3:	To keep in touch with your old friends.	0.764
Disconfirmation of Meeting New People (DMNP) CR=0.927 AVE=0.864	Compared with your pre-expectation, indicate your perception of the experience of using Facebook in performing the following functions:		
	DMNP1:	To meet new people.	0.954
	DMNP2:	To make new friends in virtual groups.	0.904
Disconfirmation of Information Seeking (DIS) CR=0.849 AVE=0.585	Compared with your pre-expectation, indicate your perception of the experience of using Facebook in performing the following functions:		
	DIS1:	To find out about things going on at your school/workplace.	0.686
	DIS2:	To keep up to date with the current trends.	0.807
	DIS3:	To get some useful information.	0.803
	DIS4:	To find out about things that are related to your interest (e.g., new applications, music, movies, books).	0.758
Disconfirmation of Entertainment (DEN) CR=0.918 AVE=0.790	Compared with your pre-expectation, indicate your perception of the experience of using Facebook in performing the following functions:		
	DEN1:	To fill up free time.	0.868
	DEN2:	For fun.	0.898
	DEN3:	To take a break from your homework/work.	0.899
User Satisfaction (SAT) CR=0.921 AVE=0.744	My overall experience of using Facebook is:		
	SAT1:	Very dissatisfied/ Very satisfied.	0.845
	SAT2:	Very displeased/ Very pleased.	0.891
	SAT3:	Very frustrated/ Very contented.	0.838
	SAT4:	Absolutely terrible/ Absolutely delighted.	0.875
Social Presence (SP) CR=0.883 AVE=0.602	SP1:	There is a sense of human in Facebook.	0.789
	SP2:	There is a sense of personalness in Facebook.	0.760
	SP3:	There is a sense of human warmth in Facebook.	0.795
	SP4:	There is a sense of sociability in Facebook.	0.767
	SP5:	There is a sense of human sensitivity in Facebook.	0.768
Social Norms (SN) CR=0.937 AVE=0.881	SN1:	My classmates (or colleagues) think that I should use Facebook.	0.929
	SN2:	My friends think that I should use Facebook.	0.948
Perceived Critical Mass (PCM) CR=0.899 AVE=0.748	PCM1:	Many people I communicate with use Facebook.	0.835
	PCM2:	Among the people I communicate with regularly, many use Facebook.	0.871
	PCM3:	The people I communicate with will continue to use Facebook in the future.	0.888
Continuance Intention to Use (CI) CR=0.872 AVE=0.773	CI1:	I intend to continue using Facebook in the future.	0.904
	CI2:	I will keep using Facebook as regularly as I do now/more than I do now.	0.853
Note: CR=Composite Reliability; AVE=Average Variance Extracted			

Discriminant Validity

Discriminant validity is the extent to which the measurement is not a reflection of some other variables. It is indicated by low correlations between the measure of interest and the measure of other constructs (Fornell and Larcker, 1981). Discriminant validity can be verified when the square root of AVE for each construct is greater than all the correlations between this construct and other constructs (Fornell and Larcker, 1987). As shown in Table 3, all the square roots of AVE were greater than the correlations between constructs, indicating good discriminant validity. To further validate the instrument, cross-factor loading was employed to assess the discriminant validity. The loading of each item on its assumed theoretical construct should be larger than its loadings on any other constructs (Chin, 1998). Table 4 showed the loadings and cross-loadings of all the measures in the research model. Results suggested the discriminant validity of all the constructs was adequate. Overall, these results support for the reliability and validity of the measurement model.

Structural Model

To better demonstrate the importance of social factors in the context of social technologies, we conducted a comparison between the baseline model (IS-continuance) and extended model (with social factors derived from the SNS environment). We presented the results of the two structural models in Figure 2 and 3, including the estimations of the path coefficients (all significant paths are indicated with asterisks), the associated t-value of the paths and the overall explanatory power.

Figure 2 depicts the result of the baseline model. The model accounts for 41.4% of the variance in satisfaction and 31.3% of the variance in continuance intention to use SNSs. All hypotheses are supported, with the exception of H3 and H4 (i.e., disconfirmation of meeting new people and disconfirmation of information seeking).

Figure 3 shows the results of the extended model. The model accounts for 44.1% of the variance in satisfaction and 48.9% of the variance in continuance intention to use SNSs. All the hypotheses are corroborated, except H3 and H4. Perceived critical mass exerts the strongest impact on continuance intention to use SNSs with a path coefficient of 0.406 (p < .001), followed by user satisfaction and social norms with path coefficients of 0.324 (p < .001) and 0.139 (p < .05) respectively. Disconfirmations of maintaining offline contacts and entertainment exert significant impact on user satisfaction with path coefficients of 0.206 (p < .01) and 0.344 (p < .001) respectively. Social presence is another important predictor that influences user satisfaction with a path coefficient of 0.207 (p < .001).

Table 3 - Correlation matrix of constructs

	DMOC	DMNP	DIS	DEN	SAT	PCM	SP	SN	CI
DMOC	**0.783**								
DMNP	0.233	**0.930**							
DIS	0.525	0.374	**0.765**						
DEN	0.595	0.239	0.498	**0.889**					
SAT	0.549	0.193	0.432	0.587	**0.863**				
PCM	0.344	0.164	0.345	0.418	0.477	**0.865**			
SP	0.538	0.188	0.488	0.458	0.500	0.380	**0.775**		
SN	0.277	0.125	0.231	0.286	0.302	0.412	0.349	**0.939**	
CI	0.387	0.186	0.419	0.470	0.560	0.618	0.479	0.404	**0.879**

Note: Diagonal elements are the square roots of average variance extracted (AVE)

Table 4 - Correlations between measures and latent variables

	DMOC	DMNP	DIS	DEN	SAT	SP	SN	PCM	CI
DMOC1	0.817	0.190	0.412	0.456	0.428	0.443	0.237	0.232	0.285
DMOC2	0.767	0.167	0.476	0.359	0.408	0.431	0.223	0.294	0.291
DMOC3	0.764	0.190	0.350	0.571	0.451	0.384	0.191	0.280	0.331
DMNP1	0.213	0.954	0.328	0.248	0.206	0.159	0.095	0.120	0.165
DMNP2	0.225	0.904	0.381	0.188	0.144	0.193	0.146	0.202	0.187
DIS1	0.474	0.204	0.686	0.334	0.342	0.423	0.167	0.197	0.312
DIS2	0.361	0.167	0.807	0.374	0.285	0.323	0.217	0.272	0.292
DIS3	0.361	0.409	0.803	0.372	0.299	0.423	0.196	0.323	0.357
DIS4	0.389	0.348	0.758	0.430	0.373	0.319	0.135	0.266	0.312
DEN1	0.583	0.201	0.401	0.868	0.493	0.446	0.299	0.334	0.397
DEN2	0.493	0.228	0.455	0.898	0.544	0.418	0.211	0.364	0.395
DEN3	0.515	0.207	0.470	0.899	0.526	0.349	0.257	0.415	0.461
SAT1	0.516	0.141	0.413	0.547	0.845	0.448	0.259	0.448	0.535
SAT2	0.483	0.203	0.390	0.496	0.891	0.450	0.255	0.406	0.467
SAT3	0.428	0.162	0.319	0.463	0.838	0.345	0.154	0.366	0.462
SAT4	0.459	0.162	0.361	0.512	0.875	0.463	0.365	0.417	0.461
SP1	0.498	0.215	0.365	0.430	0.445	0.789	0.274	0.249	0.370
SP2	0.392	0.141	0.410	0.378	0.361	0.760	0.248	0.332	0.294
SP3	0.411	0.126	0.375	0.282	0.364	0.795	0.209	0.272	0.402
SP4	0.399	0.124	0.333	0.353	0.437	0.767	0.292	0.376	0.424
SP5	0.362	0.106	0.433	0.312	0.293	0.768	0.339	0.230	0.358
SN1	0.267	0.113	0.234	0.277	0.251	0.304	0.929	0.352	0.348
SN2	0.254	0.120	0.201	0.261	0.311	0.349	0.948	0.417	0.407
PCM1	0.217	0.078	0.238	0.323	0.372	0.262	0.364	0.835	0.430
PCM2	0.288	0.151	0.282	0.314	0.365	0.307	0.342	0.871	0.468
PCM3	0.359	0.179	0.352	0.423	0.476	0.389	0.365	0.888	0.655
CI1	0.363	0.183	0.351	0.400	0.527	0.460	0.359	0.609	0.904
CI2	0.315	0.141	0.390	0.431	0.452	0.381	0.353	0.466	0.853

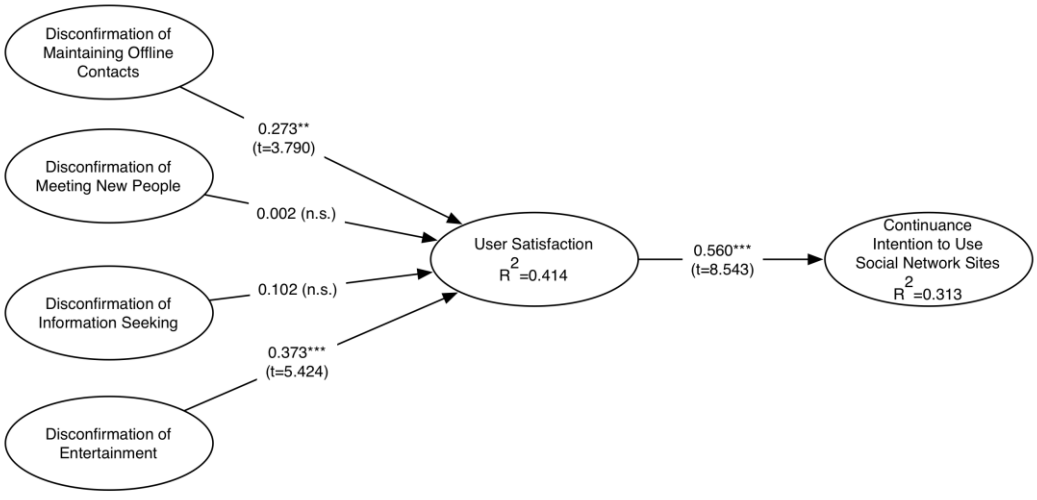
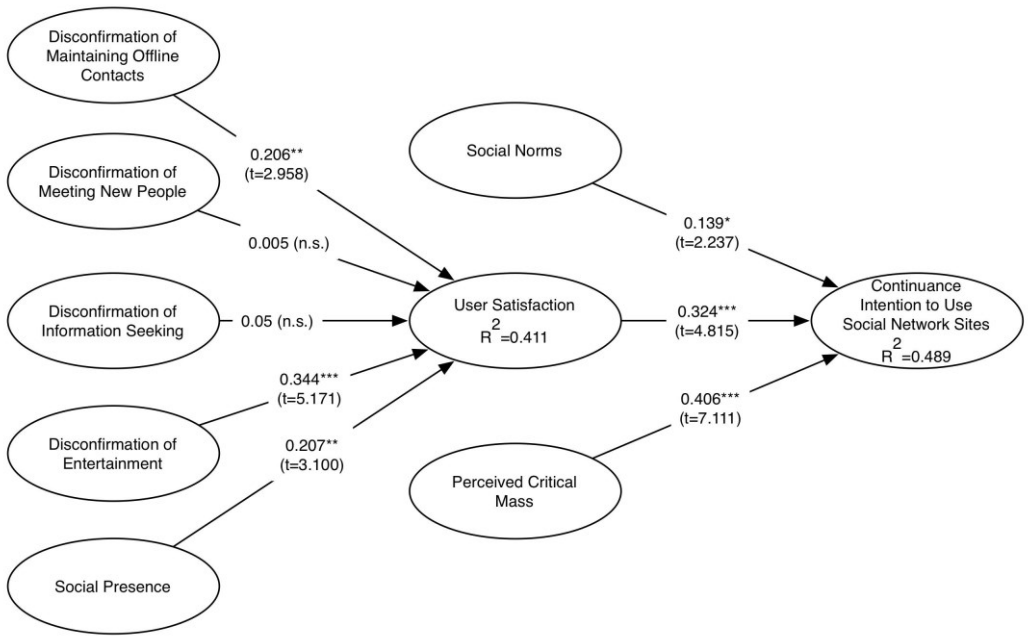


Figure 2 - PLS results of baseline model



Note: *p < .05; *p < .01; ** p < .001; *n.s.* = non-significant

Figure 3 - PLS results of the extended model

We further followed the hierarchical approach to compare the explanatory power of the baseline model and extended model (Esposito Vinzi et al., 2010). The extended model demonstrated a significant higher explanatory power over the baseline model (F = 22.386, p < .001), and suggested incorporating social factors derived from the SNS environment are essential in understanding user behavior in social technologies.

Discussion

The aim of this study is to investigate the continuance intention to use SNSs. The research model extends the expectation disconfirmation theory by incorporating the disconfirmation of SNS-specific motivations and social factors derived from the SNS environment. We posited that user satisfaction, social norms and perceived critical mass influence continuance intention to use SNSs, while disconfirmation of SNS-specific motivations and social presence predict user satisfaction. We tested the model with 204 Facebook users. The measurement model demonstrates satisfactory convergent and discriminant validity, and structural model explains 48.9% of the variance in continuance intention to use SNSs.

Research Findings

The results show that user satisfaction plays an important role in deciding continuance intention to use SNSs. Social factors derived from the SNS environment, namely perceived critical mass and social norms are essential factors that affect continuance intention to use SNSs. Social presence, confirmation of maintaining offline contacts, and confirmation of entertainment are crucial in deriving satisfaction among users. The significant effects of the proposed social factors derived from the SNS environment call for future research to look into specific features of online social platforms. As a new form of online social interaction, it is important for future research to consider and incorporate potential social factors in the SNS environment to study

user behaviors across SNSs. In this study, two hypotheses (H3 and H4) are not supported, thus leading rooms for future exploration. Disconfirmation of information seeking and disconfirmation of meeting new people have no significant effect on user satisfaction. This might be due to the fact that Facebook was originally introduced only for students to keep connections with their friends/classmates or people whom they knew on the campus, and the function of building new relationships with new people and seeking information were not included in the main design modules (Facebook, 2013b). Thus, Facebook does not dedicate to develop functions that make it more convenient and effective to make new friends and seek for information on Facebook in the later updates. Eventually, users are less likely to derive gratification of meeting new people and information seeking from using the site.

Implications for Research

Over the years, IS researchers have demonstrated the predictive power of EDT in post-adoption behaviors of traditional information systems, where the facilitations of information technologies fully determine functionalities (Bhattacherjee, 2001; Limayem et al., 2007). Yet, social network sites, as a form of new communication technology, highlighting social relations and interactions as the major objectives and key features, have not received much attention. This research contributes to the IS literature by extending the applicability of EDT to the SNS context. Prior studies have applied EDT to different domains, such as mobile service, online shopping, and e-learning (e.g., Ho, 2010; Hong et al., 2006; Wen et al., 2011), and current study confirms the generalizability and explanatory power of EDT in this new form of online social interaction. Our results also suggest that the incorporation of social factors derived from the SNS environment (i.e., social norms, perceived critical mass and social presence) into EDT provides better explanatory power in studying the continuance use behaviors in the context of SNSs. To yield a more comprehensive understanding of the post-adoption behaviors of SNS users, future study should consider social factors beyond satisfaction, coupled with the characteristics of the social technologies to test the theoretical model.

Implications for Practice

This study provides several recommendations for SNS developers who aim to create more values for their users. First, the results provide insights for SNS developers to design updates that can help to sustain user satisfaction. Maintaining offline contacts and entertainment are the two important motivations that derived user satisfaction, and have influential impacts on the continuance intention to use SNSs. Specifically, SNS developers are suggested to develop new functions that enable users to get a closer connection with their friends by sharing instant and real life impulses. SNS developers are also advised to cooperate with game developers and embed newly published games into the site, where users could have more fun when spending their time there. Second, SNS developers should pay attention to the critical mass on the site. As perceived critical mass is the predominant predictor of continuance intention to use SNSs, it is crucial for developers to seek for innovations that reinforce users' perception which a critical mass of like users is using the site. For example, SNS developers could provide "Friends match" function to alert existing users about their newly joined friends. They can also offer users customized close friends news feeds and rewards for referring a new friend to join the site. When existing users realize that more friends are joining, and friends are continuously engaging within site, they are more likely to continue their use with the sites. Finally, in response to the significant impacts of social factors derived from the SNS environment on continuance intention to use SNSs, SNS developers could offer functions that help users to connect people they met before in a convenient way, such as providing recommended friends or

related search features. SNS developers could also design features and functions that increase the feeling of social presence within the sites. Recently, the newly launched feature "Timeline" in Facebook has provided users an overview of the activities of their friends and helped users to perceive a higher presence of their friends in the platform (Facebook, 2013b). In sum, by fulfilling the needs of the users, and retaining a large number of active and satisfied users, the site can attract more advertisement and subscription, and thus gain long-term viability and sustainability.

Limitations and Future Research Directions

This current study is subjected to some limitations. First, we collected data through convenient sampling in a group of Hong Kong Facebook users, where external validity might be a threat to the generalizability of the findings. As different types of SNSs may have their unique objectives and social interaction features, cautions need to be taken in generalizing the results to other SNSs. In an attempt to mitigate this concern, we have chosen the research context and target respondent carefully in the study. Facebook is currently one of the most well-established and widely adopted SNSs. In addition, Hong Kong users are one of the heaviest user groups among the globe. Thus, we believed that Facebook should be a compelling sample for the current study. Scholars could enhance the generalizability of the findings by replicating this study in different demographic backgrounds, cultural contexts, and social network sites. Second, we based on cross-sectional data to test the model, where interrelationships are confirmed only. However, the individual behavioral intention is an ongoing process in a dynamic world of technological changes. Longitudinal research studying individual actual continuance usage behavior is needed to yield better explanation on the continuance intention of using SNSs. Finally, the research data was drawn from current SNS users. Individuals who have discontinued their use with SNSs may have different attitudes towards the continuance intention to use SNSs. Future research should attempt to recruit discontinued users into the study for better understanding of continuance behaviors.

Conclusion

Social network sites have become a significant phenomenon in human communication, transforming how people connect and communicate with each other. Although great interests have been devoted to understanding SNSs among researchers both in IS and other disciplines, this study contributes to the literature by exploring why users continue to use SNSs, which is utterly important to the sustainability of SNSs. This study is expected to generate interests among researchers and serve as a starting point for furthering the limited understanding of continuance behaviors in social network sites.

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